

WATER BORNE DISEASES

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It is well recognized that the prevalence of water-borne diseases can be greatly reduced by provision of clean drinking water and safe disposal of feces.

An Overview of the Safe Drinking Water



Objectives

- Explain threats to drinking water
- Describe the hydrologic cycle and pathways of contamination
- Understand the history of drinking water regulation
- Describe the major SDWA programs

Threats to Drinking Water

Contaminants and Health Effects



Discussion

- What contaminants pose a public health threat to your daily water?
- Do threats from public and private water supplies differ?
- What are the effects of these potential health threats?



Contaminant Effects

- Acute health effects
- Chronic health effects
- Aesthetic concerns



Types of Pathogens

- Viruses (e.g., Norwalk virus, rotaviruses)
- Bacteria (e.g., *Shigella*, *E.coli*)
- Parasites, protozoa and cysts (e.g., *Giardia lamblia*, *Cryptosporidium*)

Bacteria

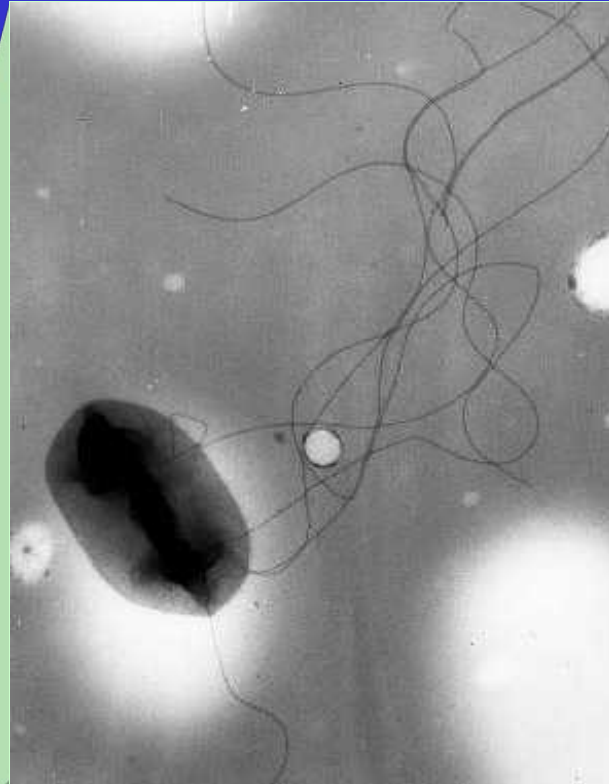


Photo: CDC. *E. coli* 0157:H7

Viruses

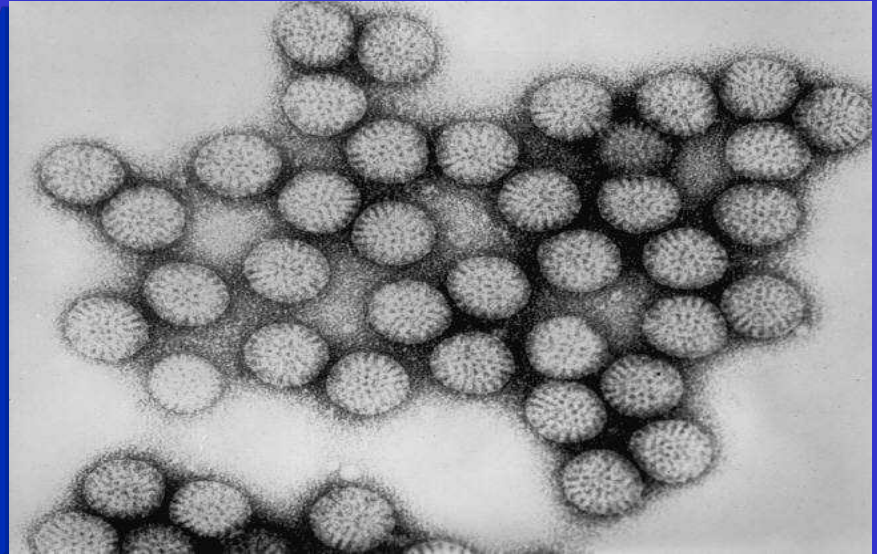
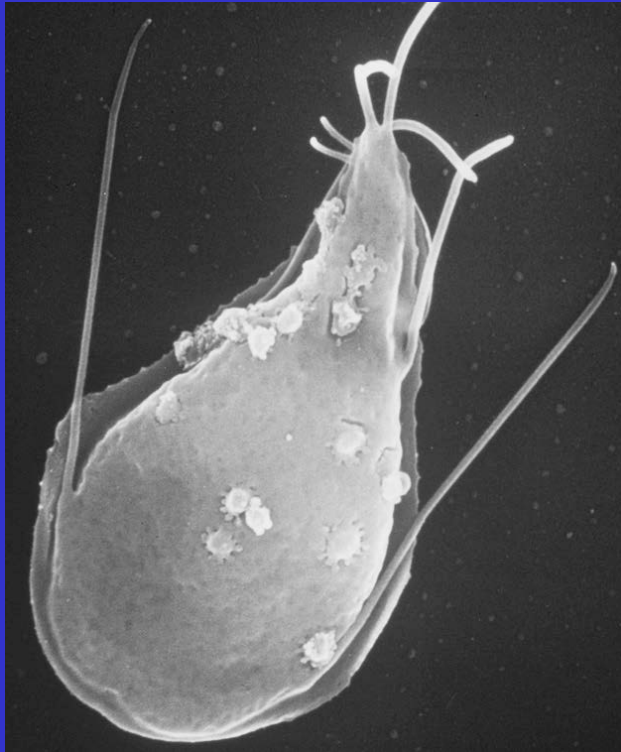


Photo: Rotavirus, ASM Digital Collection

Protozoa



Giardia



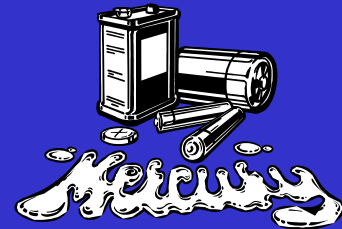
Cryptosporidium

Hazardous Contaminants

- Water-borne cysts and spores like giardia and cryptosporidium
- Industrial volatile organic compounds (VOCs)
- Agricultural synthetic organic compounds (SOCs)
- DDT
- Detergents
- Pesticides
- Aluminum
- Chlorine
- Asbestos
- Cadmium
- Copper
- Lead
- Mercury
- Radon 22
- Silt
- Sand

Types of Contaminants Causing Chronic Health Effects

- Volatile organic chemicals (VOCs)
- Inorganic chemicals (IOCs)
- Synthetic organic chemicals (SOCs)
- Radionuclides



Water Borne Diseases

Anemia	Arsenicosis	Ascariasis	Botulism
Campylobacteriosis	Cholera	Cryptosporidiosis	Cyanobacterial toxins
Dengue	Diarrhoea	Dracunculiasis	Fluorosis
Giardiasis	Hepatitis	Hookworm infection	Japanese encephalitis
Lead poisoning	Legionellosis	Leptospirosis	Lymphatic filariasis
Malaria	Malnutrition	Methaemoglobinemia	Onchocerciasis
Polio	Ring Worm	Scabies	Schistomiasis
Trachoma	Trichuriasis	Typhoid	SARS

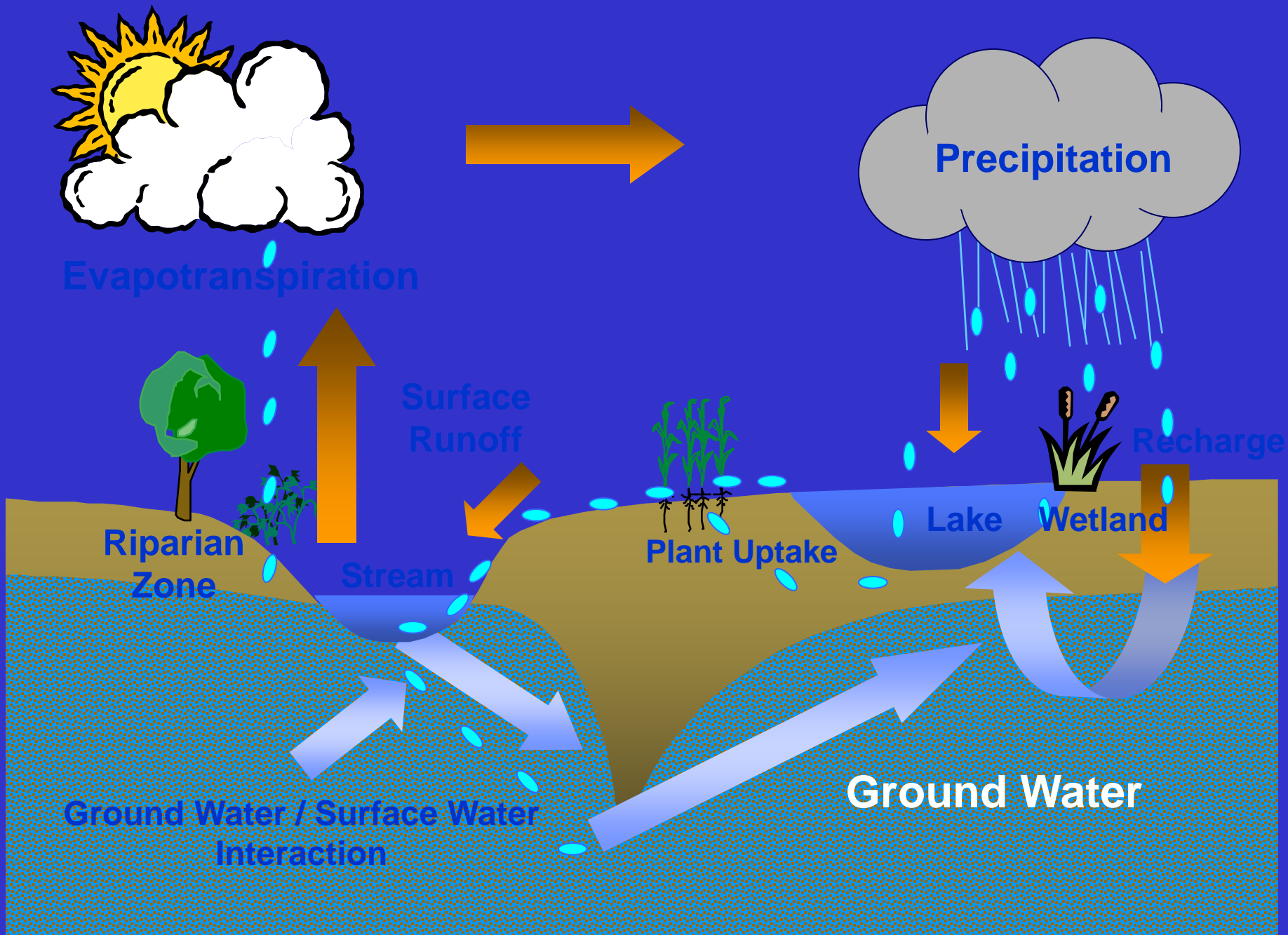
Discussion

- Where do microbiological and chemical contaminants come from?

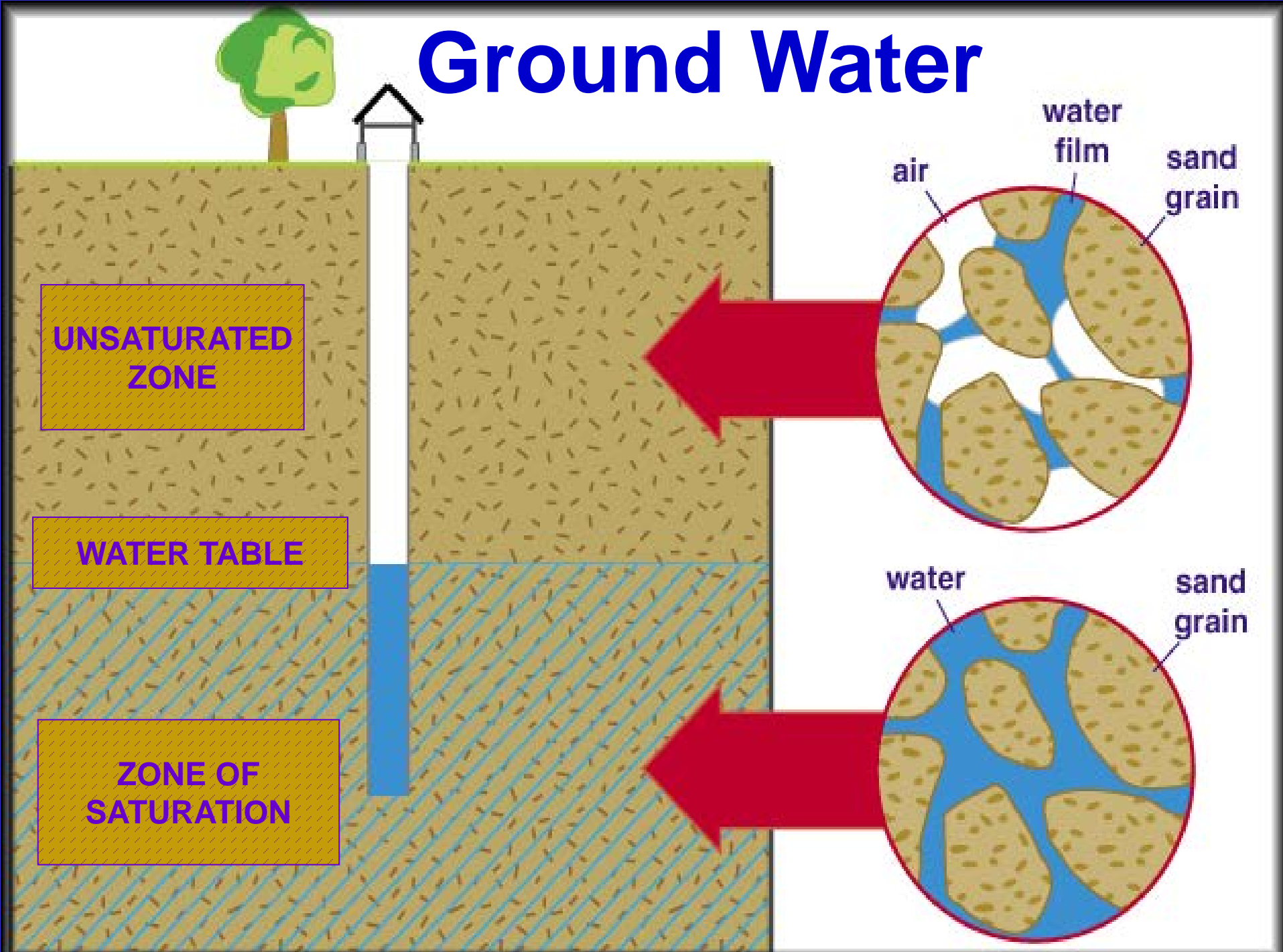


The Hydrologic Cycle, Sources of Drinking Water, and Pathways of Contamination





Ground Water



Discussion

- Name as many sources of drinking water as possible

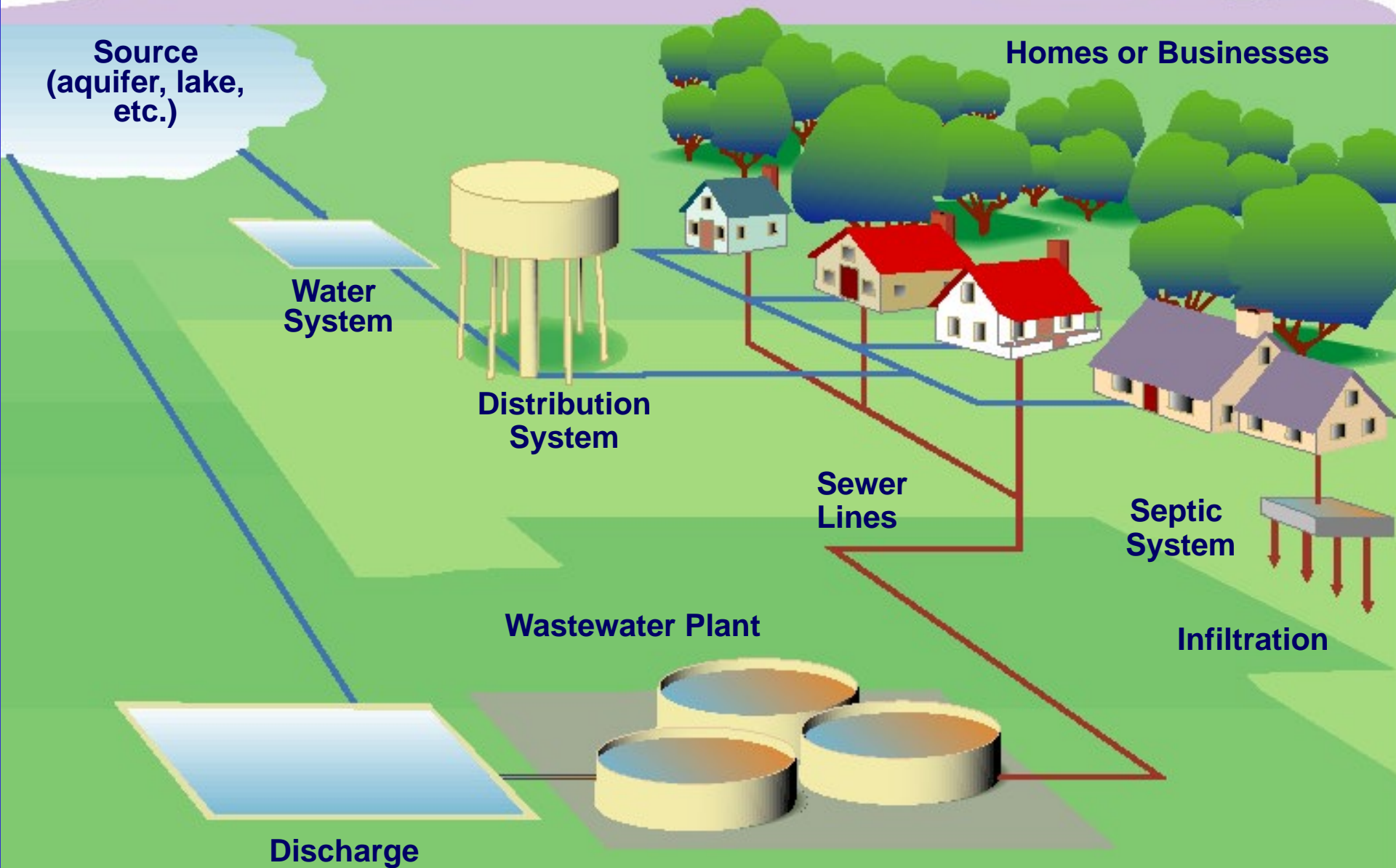


Sources of Drinking Water

- Surface water
- Ground water
- Ground water under the direct influence of surface water
- Desalinated sea water
- Rain water



The Drinking Water Cycle

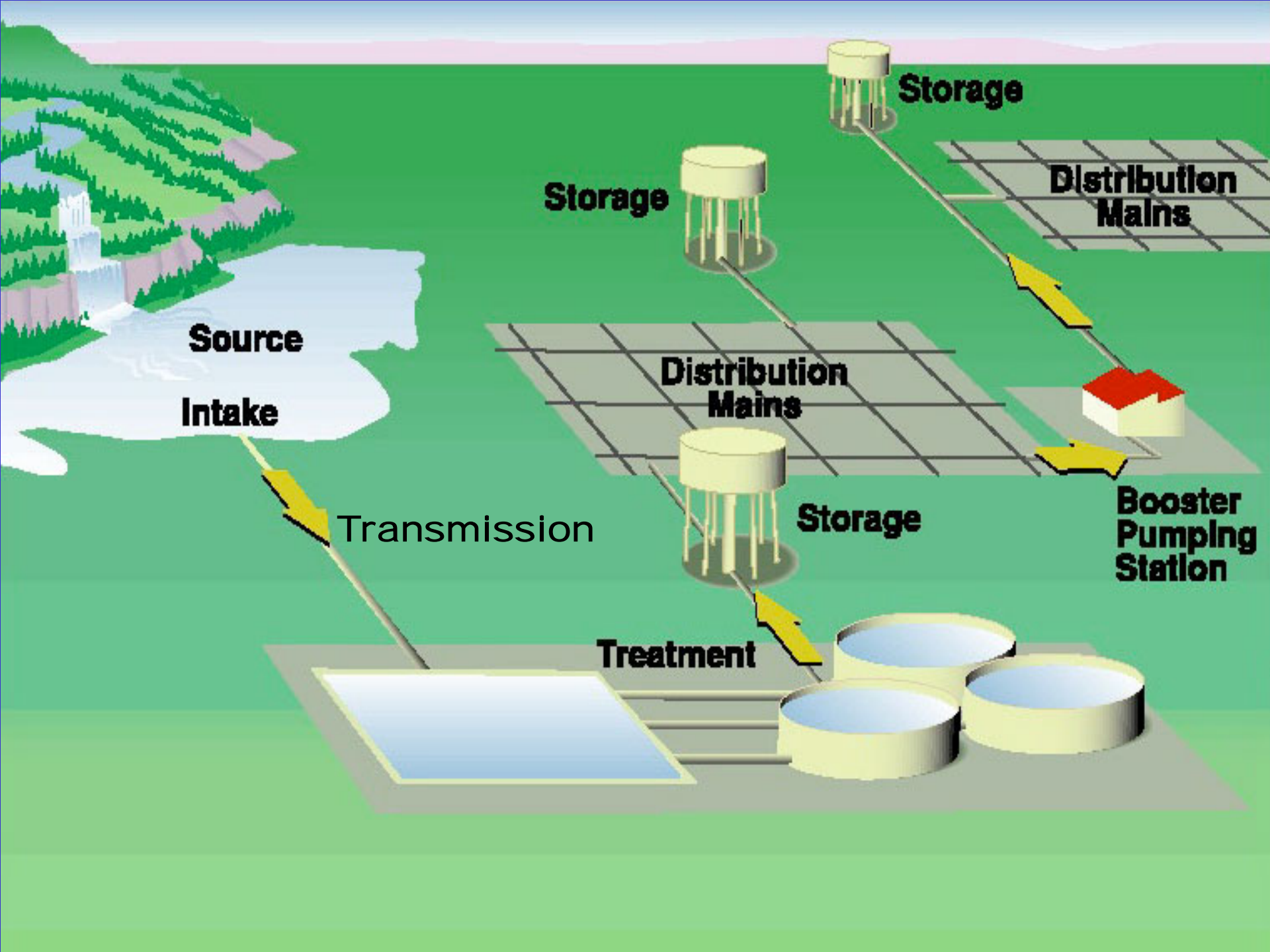


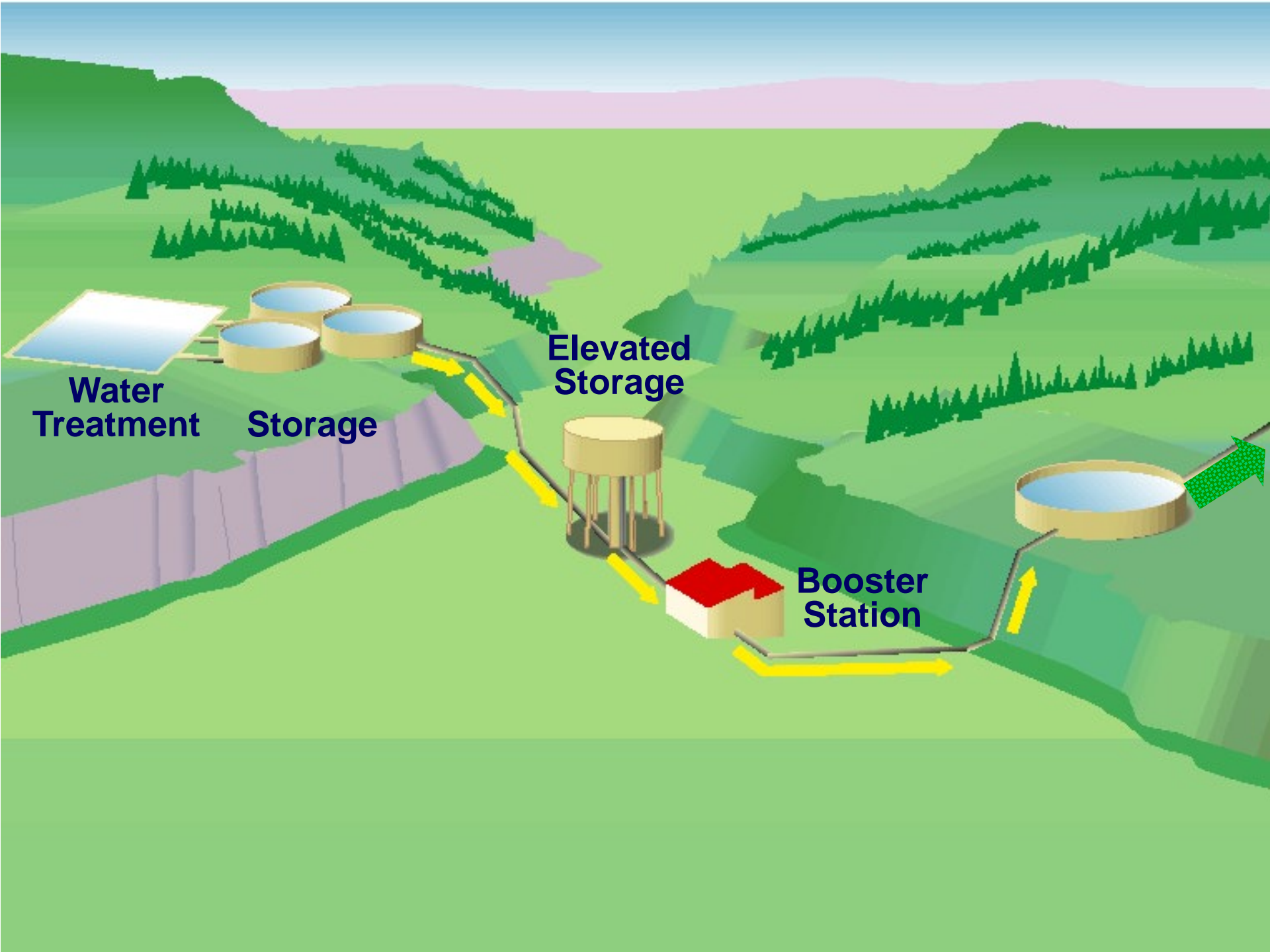
Sources of Contamination



What Is a Water System and How Is it Regulated?





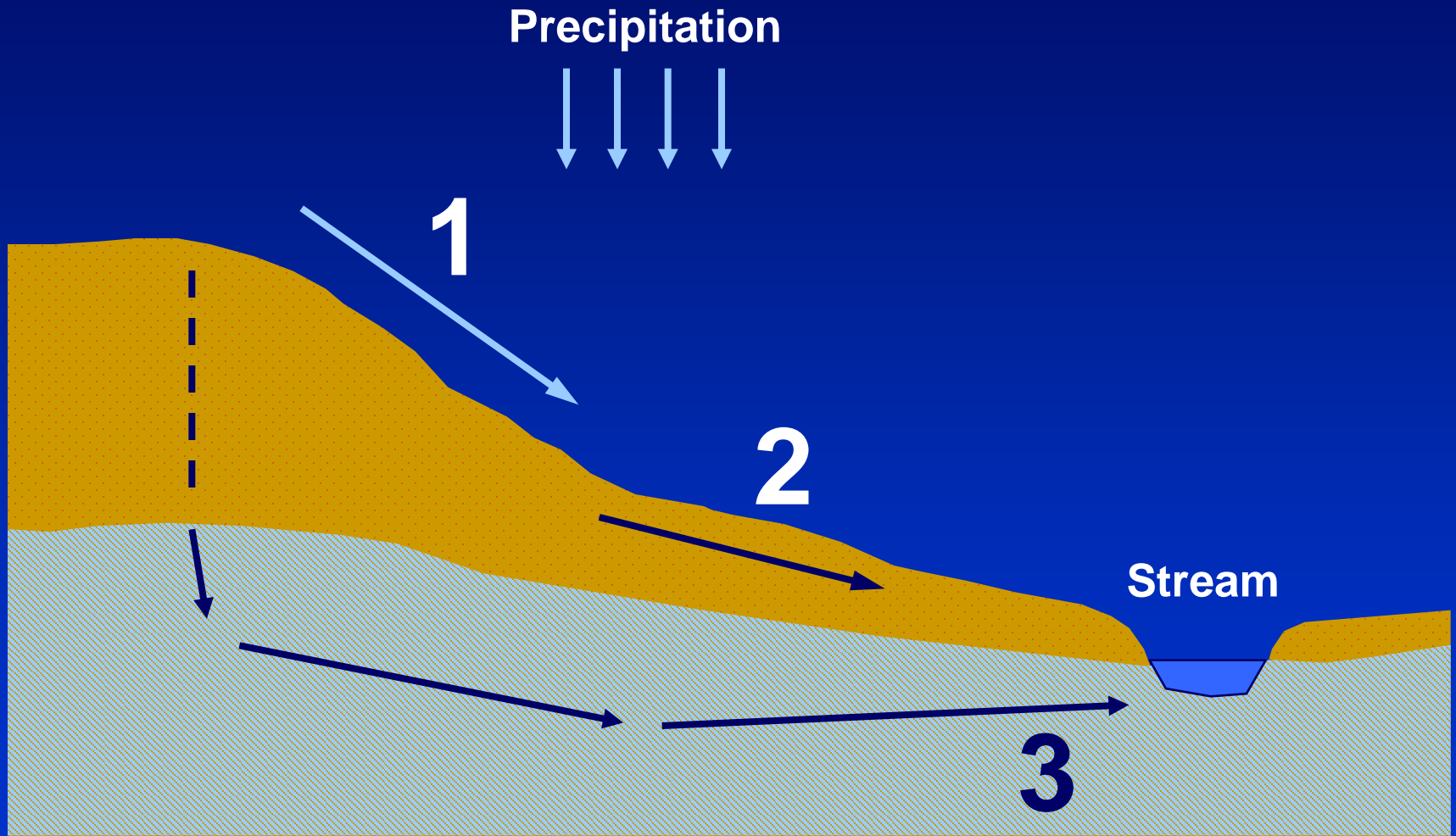


Discussion

- Why divide water systems into the various classifications?
- Why only regulate systems serving 25 or more people?



Paths of Water Flow Within Watershed

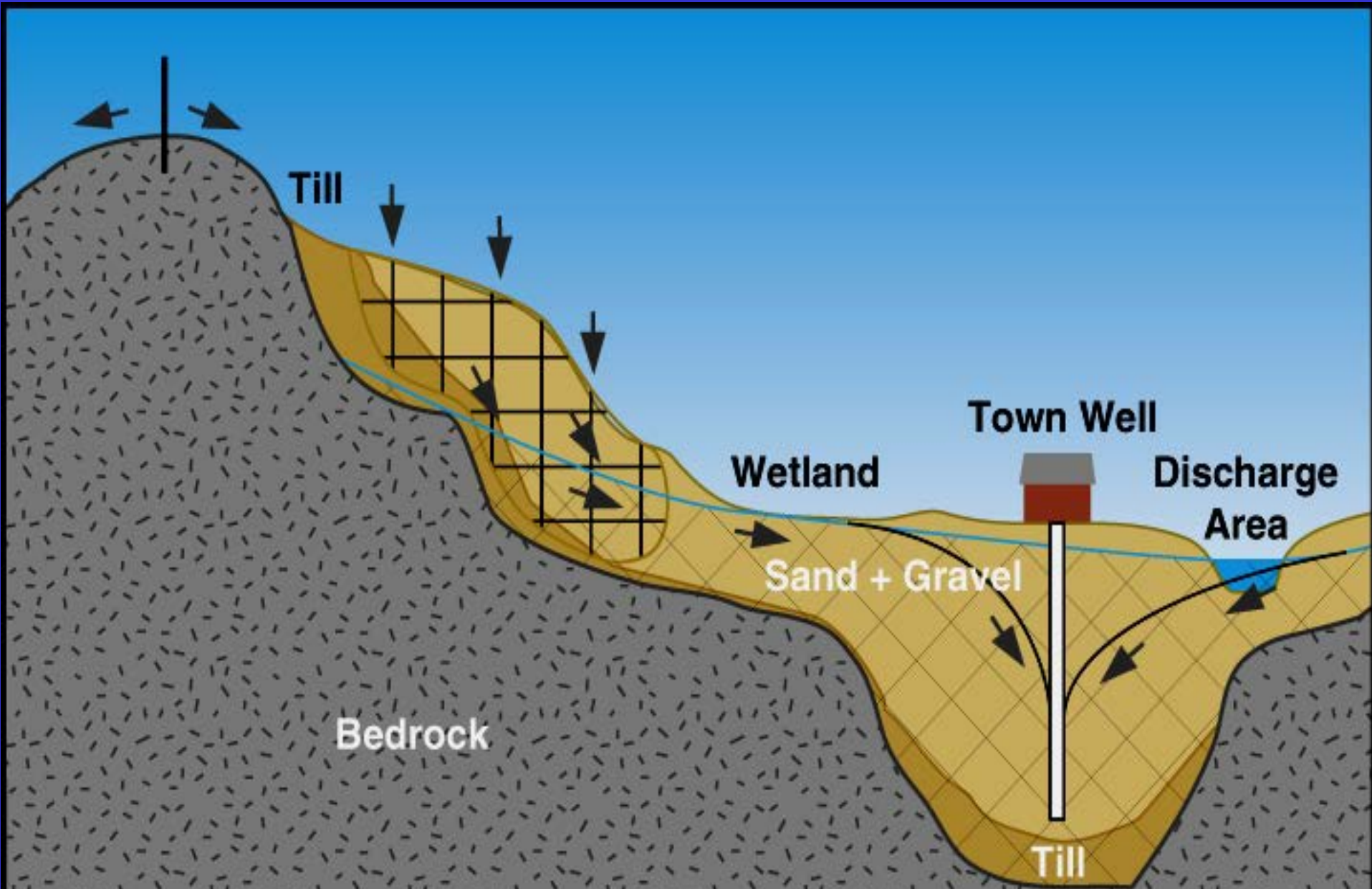


1. Overland Flow

2. Shallow Subsurface Storm Flow

3. Ground Water Flow

Determining The Areas To Be Protected



SDWA Programs Today

- Protect public health through:
 - Contaminant standard setting
 - Source water protection
 - Underground injection control
 - Public water system supervision

Methods of Disinfection

It is well recognized that the prevalence of water-borne diseases can be greatly reduced by provision of clean drinking water and safe disposal of feces.

The two most common methods to kill microorganisms in the water supply are:

1. Oxidation with chemicals such as chlorine, chlorine dioxide or ozone
2. Ultra-Violet Irradiation